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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,709	08/25/2003	Sadayuki Ohnishi	Q76993	9821

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EXAMINER	
CAO, PHAT X	

ART UNIT	PAPER NUMBER
2814	

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07/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/646,709	OHNISHI, SADAYUKI	
	Examiner	Art Unit	
	Phat X. Cao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-32,34 and 35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-32,34 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Requested for Continued Examination and the cancellation of claims 1-26 and 33 in Paper filed on 6/8/07 is acknowledged.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 27, 29-32, and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barth et al (US. 2004/0173908) in view of Lee (US. 2003/0067077) and Lauterbach et al (US 6,313,517).

Regarding claims 27 and 29-30, Barth (Fig. 1) discloses a semiconductor substrate 10, and a metal wiring 15 and an interlayer dielectric film (17,18,19) which are formed on the semiconductor substrate 10, the interlayer dielectric film (17,18,19) including a multi-layered structure consisting of: a diffusion barrier film 17 preventing diffusion of the metal out of the metal wiring 15 (par. [0006], last 3 lines), an adhesive film 18 (par. [0007]) formed directly on the diffusion barrier film 17, and a low dielectric constant film 19 of polymeric thermoset material (i.e., SILK) (par. [0008], lines 1-7) formed directly on the adhesive film 18, the low dielectric constant film 19 (or 119 in Fig. 2) being constituted essentially by an organic low dielectric constant material having a specific dielectric constant not greater than 4 (par. [0031]), and the organic low dielectric

constant material 19 (Fig. 1) or 119 (Fig. 2) being a silicon-containing organic compound of methylsilsequioxane or SiOC (par. [0031]).

Barth does not disclose that the adhesive film 18 is a silicon-based compound of BCB having an aromatic ring.

However, Lee (Fig. 1I) teaches an interlayer dielectric film formed on a metal wiring 116a, the interlayer dielectric film including: a lamination consisting of an adhesive film 118 constituted by a compound of polymer benzocyclobutene (BCB) having a benzene ring (aromatic ring) in its molecule (par. [0019]), and an organic low dielectric constant film 120 having a specific dielectric constant not greater than 4 (pars. [0014] and [0021]) formed directly on the adhesive film 118. And Lauterbach (column 3, lines 50-66 through column 4, lines 1-16) teaches the well-known feature of having polymer benzocyclobutene film being a silicon-containing organic compound (see formula at column 4) for providing a good adhesion to the metal wiring layer/dielectric layer (column 4, lines 10-13). Accordingly, it would have been obvious to form the adhesive film 18 of Barth with the material as set forth above because such silicon-containing organic compound BCB adhesive layer would provide a good adhesion to the metal wiring layer/organic dielectric layer and would prevent a crack issue, as taught by Lee (par. [0019]) and by Lauterbach (column 4, lines 10-13).

Regarding claim 31, Lauterbach (column 3, lines 50-66 through column 4, lines 1-16) also teaches the forming of an adhesive BCB, the adhesive BCB is a polymer silicon-based compound formed through polymerization of a monomer containing a divinylsiloxane bisbenzocyclobutene unit.

Regarding claims 32 and 34, Barth further discloses that the organic low dielectric constant material 19 (Fig. 1) or 119 (Fig. 2) is a silicon-containing organic compound of methylsilsequioxane or SiOC (par. [0031]).

Regarding claim 35, Barth's Fig. 1 also discloses the interlayer dielectric film (17,18,19) is formed on the metal wiring 15.

4. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barth et al, Lee and Lauterbach et al as applied to claim 27 above, and further in view of Applicant's admitted prior art.

Barth discloses the diffusion barrier film 17 being made of SiN (par. [0006], last 3 lines), but does not disclose the diffusion barrier film 17 being made of SiCN.

However, Applicant's admitted prior art (Fig. 3) teaches the contact structure including a diffusion barrier film 108 of SiCN formed on a metal wiring 106. Accordingly, it would have been obvious to substitute SiN with SiCN because they both have the same function as a diffusion barrier film for preventing diffusion of the metal out of the metal wiring.

Response to Arguments

5. In response to Applicant's argument that benzocyclobutene polymer of Lee does not necessarily contain a silicon as a base, the reference issued to Lauterbach is applied to teach the known feature of forming benzocyclobutene polymer having a silicon as a base for providing a good adhesion to the metal wiring layer/organic dielectric layer.

Applicant further argues that it would not be obvious to combine Barth with Lee because Lee fails to teach or suggest the BCB adhesive layer 118 providing the adhesion to an organic dielectric film made of silicon-containing organic compound.

The examiner has recognized these shortcomings and what Applicant argues is not shown by one reference is clearly taught by the other. It should be noted that the rejection is not based on anticipation, but rather, is based on obviousness. The examiner relies on the combined teachings of Barth, Lee and Lauterbach. Lee and Lauterbach are not relied on for teaching an adhesive film adhered to an organic dielectric film made of silicon-containing organic compound. Barth discloses the adhesive film 118 adhered to the organic dielectric film 119 made of silicon-containing organic compound (par. [0031]). Lee and Lauterbach are relied on for showing that it was known to use a silicon-based compound BCB dielectric film as an adhesive layer. Thus, these arguments are arguments against the references individually but, clearly, these are not proper arguments where references are applied in combination. *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is 571-272-1703. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PC
July 2, 2007

PHAT X. CAO
PRIMARY EXAMINER